DGPs Preconference Workshop 2018

Multinomial Processing Tree (MPT) Modeling: Basic Methods and Recent Advances

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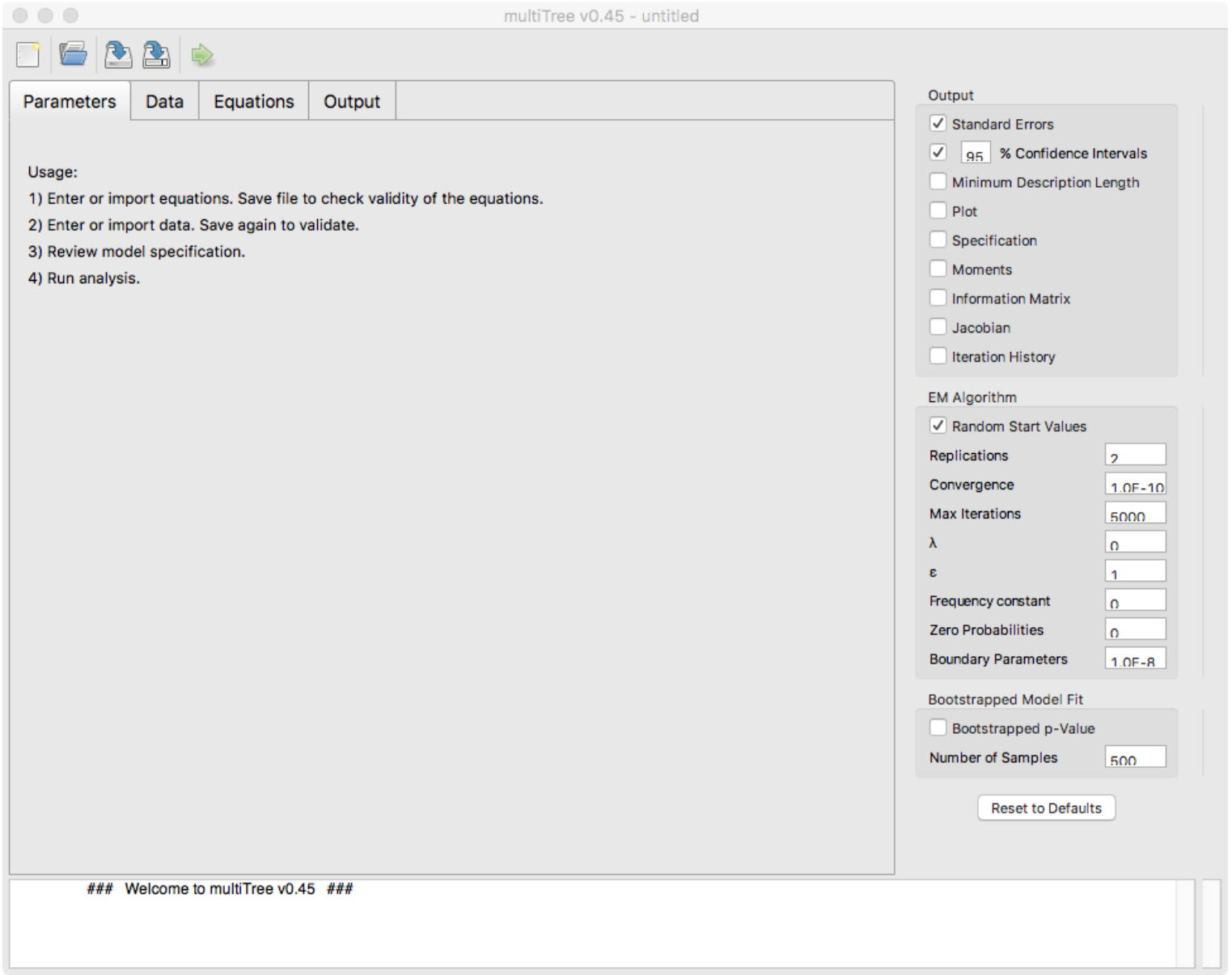
2) Applications I

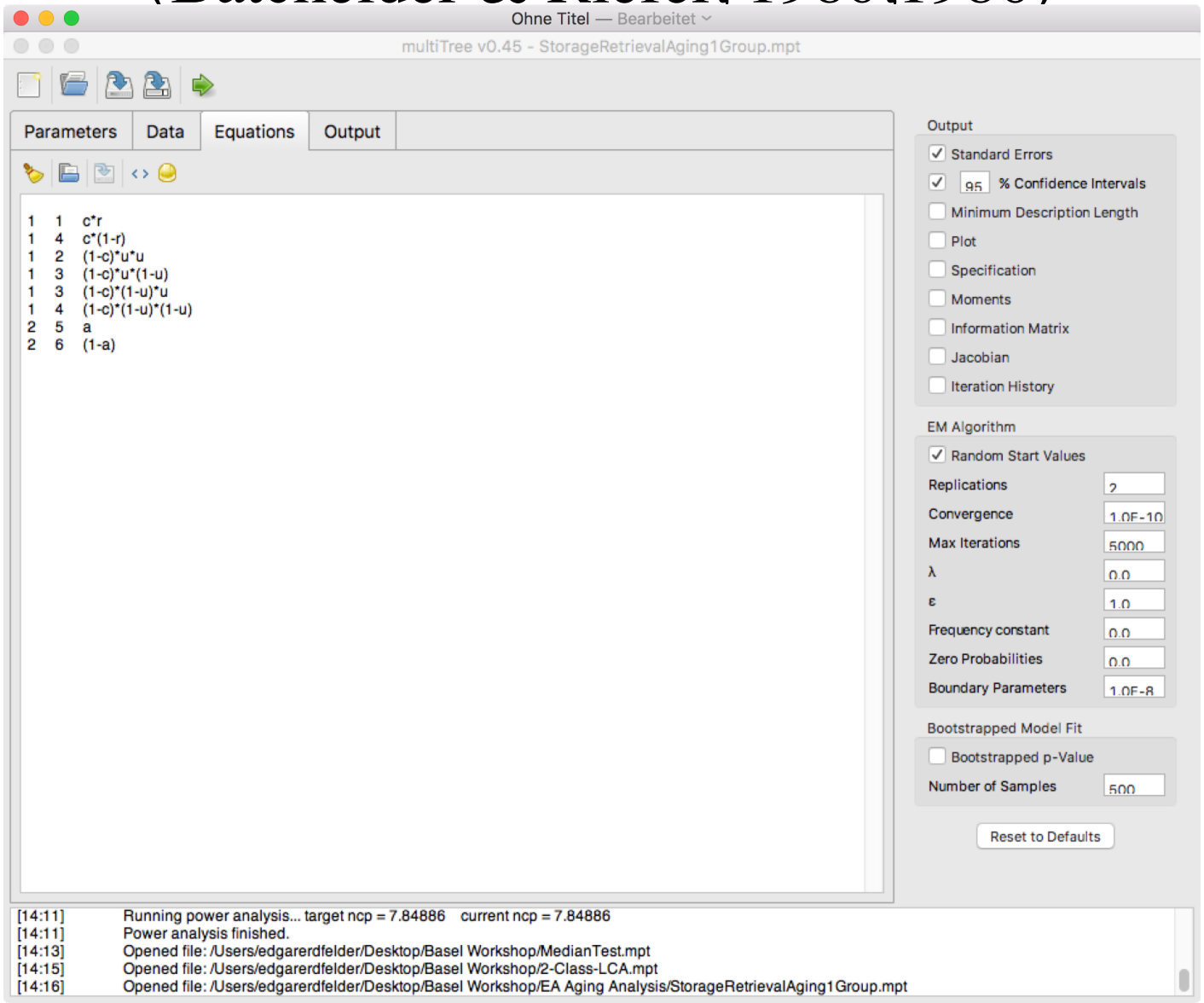
- 2.1) Introduction to multiTree
- 2.2) Practical exercises
- 2.3) Order constraints
- 2.4) Testing interactions

2.1) Introduction to multiTree

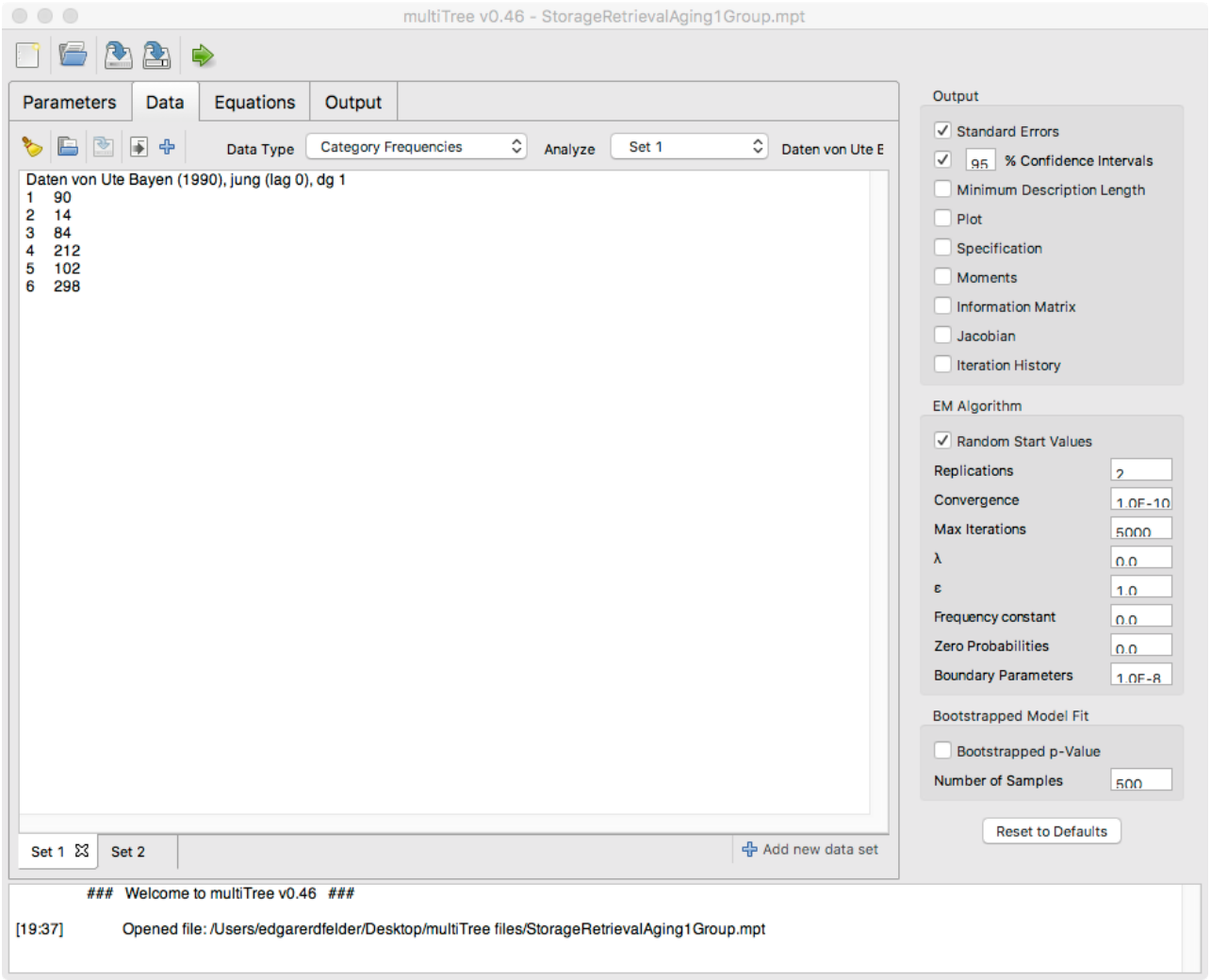


Storage-Retrieval Model

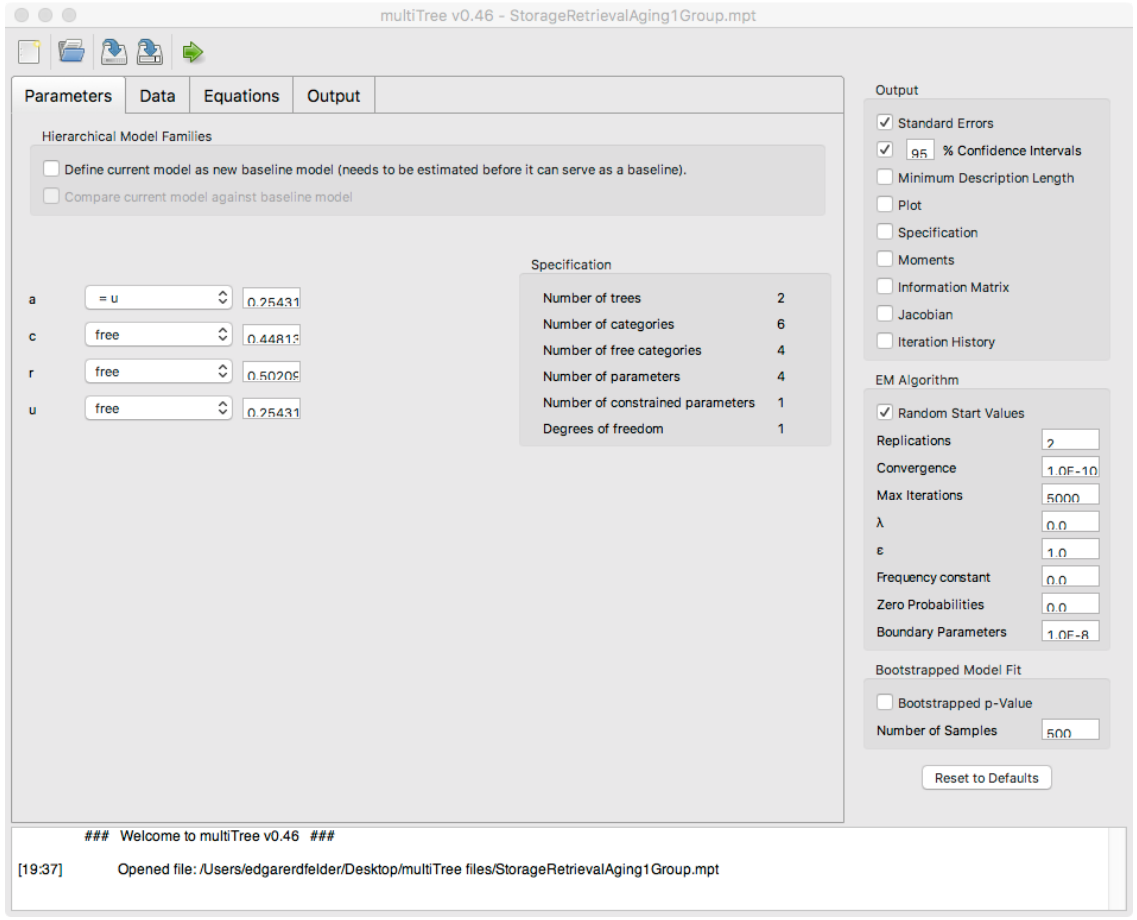
(Batchelder & Riefer, 1980,1986)



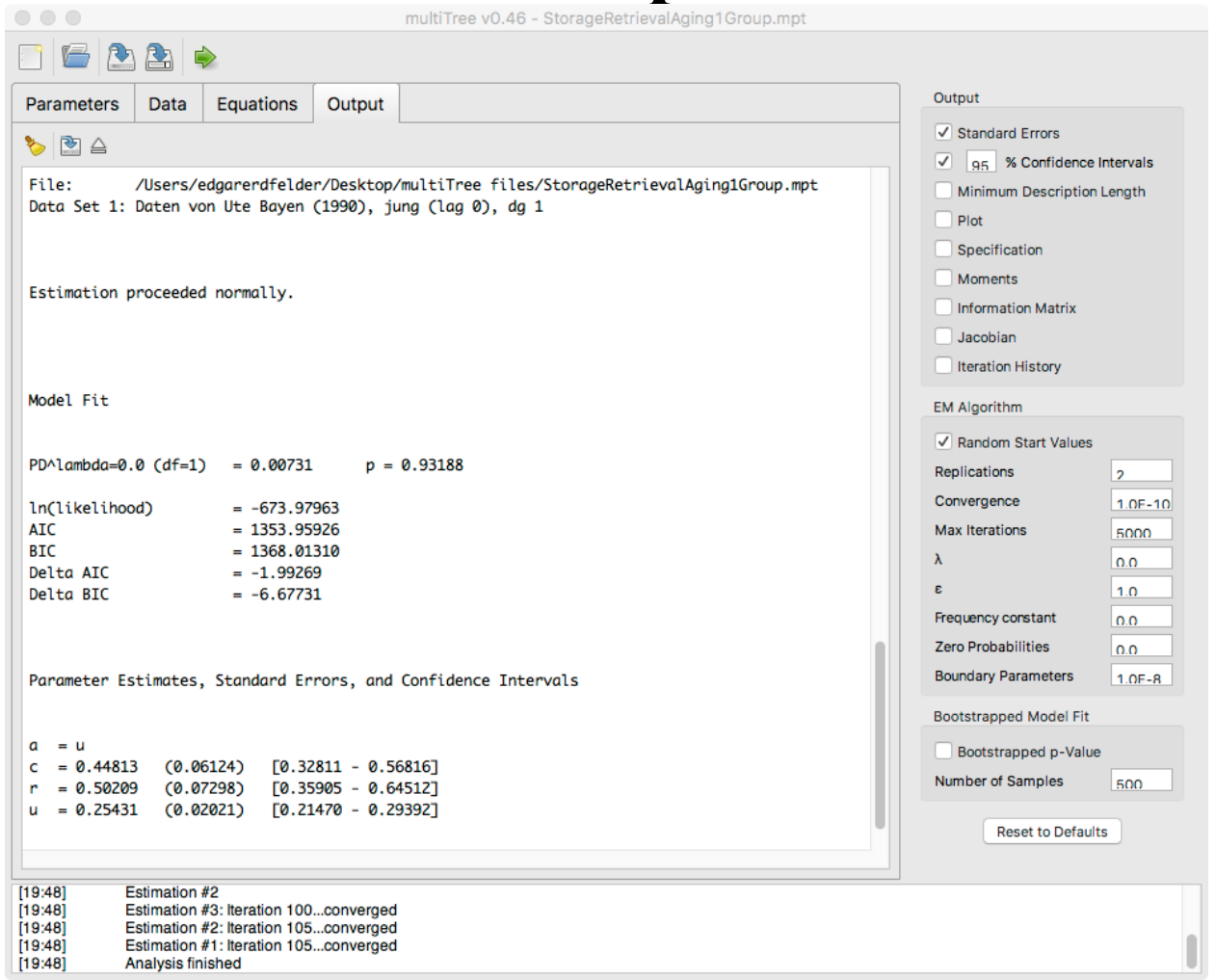
Data


multiTree v0.46 - StorageRetrievalAging1Group.mpt
Parameters
Data
Equations
Output
Data Type
Category Frequencies
Analyze
Set 1
Daten von Ute E
Daten von Ute Bayen (1990), jung (lag 0), dg 1
1 90
2 14
3 84
4 212
5 102
6 298
Set 1
Set 2
Add new data set
Output
Standard Errors
95 % Confidence Intervals
Minimum Description Length
Plot
Specification
Moments
Information Matrix
Jacobian
Iteration History
EM Algorithm
Random Start Values
Replications
Convergence
Max Iterations
λ
ε
Frequency constant
Zero Probabilities
Boundary Parameters
Bootstrapped Model Fit
Bootstrapped p-Value
Number of Samples
500
Reset to Defaults
Welcome to multiTree v0.46
[19:37] Opened file: /Users/edgarerdfelder/Desktop/multiTree files/StorageRetrievalAging1Group.mpt

Model definition and analysis



Output


multiTree v0.46 - StorageRetrievalAging1Group.mpt
Parameters
Data
Equations
Output
File: /Users/edgarerdfelder/Desktop/multiTree files/StorageRetrievalAging1Group.mpt
Data Set 1: Daten von Ute Bayen (1990), jung (lag 0), dg 1
Estimation proceeded normally.
Model Fit
PD^lambda=0.0 (df=1) = 0.00731 p = 0.93188
ln(likelihood) = -673.97963
AIC = 1353.95926
BIC = 1368.01310
Delta AIC = -1.99269
Delta BIC = -6.67731
Parameter Estimates, Standard Errors, and Confidence Intervals
a = u
c = 0.44813 (0.06124) [0.32811 - 0.56816]
r = 0.50209 (0.07298) [0.35905 - 0.64512]
u = 0.25431 (0.02021) [0.21470 - 0.29392]
Output
Standard Errors
95 % Confidence Intervals
Minimum Description Length
Plot
Specification
Moments
Information Matrix
Jacobian
Iteration History
EM Algorithm
Random Start Values
Replications 2
Convergence 1.0E-10
Max Iterations 5000
λ 0.0
ε 1.0
Frequency constant 0.0
Zero Probabilities 0.0
Boundary Parameters 1.0E-8
Bootstrapped Model Fit
Bootstrapped p-Value
Number of Samples 500
Reset to Defaults
[19:48] Estimation #2
[19:48] Estimation #3: Iteration 100...converged
[19:48] Estimation #2: Iteration 105...converged
[19:48] Estimation #1: Iteration 105...converged
[19:48] Analysis finished

2.2) Practical exercises

- Estimate the storage-retrieval model for young and old partipants jointly
- Does *c* differ significantly between age groups?
- Does *r* differ significantly between age groups?

2.3 Order constraints

- To impose the order constraint

  c(old) <= c(young),

  set

  $c(\text{old}) = x_c \cdot c(\text{young})$

2.4 Testing interactions

- To test the H_0 that the decline with aging is the same in *storage* c and *retrieval r* (i.e, no interaction with aging)

  set

  $c(\text{old}) = x_c \cdot c(\text{young})$

  $r(\text{old}) = x_r \cdot r(\text{young})$

  and test the equality constraint

  H_0: $x_c = x_r$